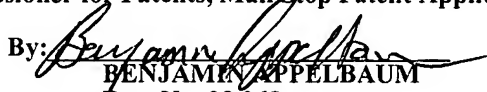


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By: 
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**APPLICATION FOR LETTERS PATENT OF
THE UNITED STATES**

INVENTOR: SIDNEY SCHNEIDER

TITLE OF INVENTION: SELF-FABRICATED DENTURE

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1 SELF-FABRICATED DENTURE

2
3 CROSS REFERENCES TO RELATED APPLICATIONS

4
5 This application claims the benefit of United States
6 Provisional Patent Application, Ser. No. 60/475,977, filed 6 June
7 2003, the contents of which are incorporated by reference herein.
8

9 FIELD OF THE INVENTION

10
11 An embodiment of the present invention is a ready made denture
12 intended for use by edentulous persons, which can be fitted by the
13 individual user, eliminating the need for numerous trips to a
14 dental professional for custom fitting and preparation, and which
15 is available at a greatly reduced cost. Embodiments include an
16 upper denture, a lower denture, or a set including both an upper
17 and a lower denture. The denture includes a layer of a heat-
18 moldable denture reline material, and by immersion in heated water
19 for several minutes can be adapted to fit an individual's mouth.
20 After the reline material has softened, the user inserts the
21 denture into their mouth, presses it against the gum to fit, with
22 the reline material conforming to the shape of the individual's
23 gum.
24

25 BACKGROUND OF THE INVENTION

26
27 The use of fluoride in community water systems, or application
28 of topical fluoride treatments by dental professionals, and
29 improved toothbrushing appliances and dental care products, among
30 others, have resulted in people maintaining their natural teeth for
31 much, if not all, of their lifetime. People still may lose some or
32 all of their teeth, through improper dental care, accident, disease
33 or other reasons. Artificial teeth, inserted into the mouth in the
34 form of dentures, have been known for centuries, with improvements
35 made in the materials used and methods of manufacture thereof. But

1 the use of dentures has generally required that the person make
2 several trips to the dentist, over a period ranging from several
3 days to several weeks or longer, with one visit for the taking of
4 an impression, and one or more for fitting and adjustment of the
5 dentures. The costs associated with preparing such dentures can be
6 high, and the discomfort associated with both the fitting process
7 and sometimes the wearing of dentures prevents some people from
8 obtaining or using them. Consequently, some people choose to
9 remain edentulous, or to live with missing teeth, rather than
10 obtain dentures.

11
12 Prior art patents disclose cosmetic dentures, and various
13 methods to prepare dentures.

14
15 For example, Albert et al. (U.S. Pat. No. 5,951,291) disclose
16 a cosmetic accessory for teeth, the device including a gum portion
17 and a tooth portion shaped and dimensioned to cover the user's
18 upper or lower front teeth. The device, preferably manufactured
19 from a room-temperature curable material, such as silicone, is held
20 in place by custom fitted inner projections that match the spaces
21 between the user's own front teeth.

22
23 Ginsburg et al. (U.S. Pat. No. 5,775,900) disclose a method of
24 producing and fitting stents and temporary dentures using their
25 thermodeformable characteristics. The stent or the temporary
26 denture is heated to a temperature above 120 degrees F, such that
27 these devices become malleable and may be molded in the mouth or on
28 a model of the patient to attain an approximation of the tissue
29 surfaces. U.S. Pat. No. 5,304,063 discloses a method of producing
30 and fitting complete dentures, using a thermoformable material.

31
32 In U.S. Pat. No. 5,451,498 Hazen discloses a cosmetic denture
33 which covers existing teeth and gums and is created from an
34 impression mold of the user's teeth and gums; the denture is not
35 permanently affixed to the teeth. By contrast, embodiments of the

1 present invention do not require that an impression be made of the
2 individual patient's mouth.

3
4 Huybrechts (U.S. Pat. No. 5,431,563 discloses a thermoplastic
5 moldable composition and products manufactured using this
6 composition. The composition can be used to prepare custom denture
7 liners, orthotics for hands and feet, and other uses, by heating
8 the molded article at an elevated temperature (over 50 degrees C,
9 usually between 50 degrees C and 95 degrees C). The inventor notes
10 a problem created by obtaining an absolutely perfect fit: inserting
11 and removing it may be extremely difficult if not impossible for
12 the patient.

13
14 In U.S. Pat. No. 4,705,476 Blair discloses a method and
15 apparatus to produce artificial dentures using full arch upper and
16 lower sets of artificial teeth connected together, and opposite
17 sides of each arch formation are braced to stabilize their shape.

18
19 Hazar (U.S. Pat. No. 4,470,815) discloses a method of making
20 custom dentures from an uncured resin module. The module is molded
21 to one of three standard sizes, and includes sockets for the
22 insertion of artificial teeth. The module is cooled to a low
23 temperature to impart rigidity to it, and to prevent curing of the
24 resin. In use, teeth are inserted into the module, which is then
25 conformed to a heated cast representation of the patient's oral
26 cavity, and the module itself is then heated to cure the module,
27 thereby providing a custom fit. Once the teeth have been inserted
28 into the module and their positions adjusted, the module containing
29 the teeth is immersed in hot water to effect curing. The heating
30 step in Hazar effects curing and keeps the teeth fixed, whereas
31 embodiments of the present invention use a heating step to soften
32 the denture enabling it to be molded to the user's oral cavity.

33
34 In U.S. Pat. No. 6,077,075, Bedard et al. disclose a dental
35 appliance and process in which a laminate material is made flexible

1 by heating it at a temperature which is tolerable to the body, for
2 example, roughly 20 degrees F. above body temperature, immediately
3 prior to its installation.
4

5 Wagner (U.S. Pat. No. 4,401,616) discloses heating of a blank
6 sheet of thermoplastic material to a temperature above its
7 softening point, after which the softened material is placed over
8 a built-up study model of the jaw ridge of a patient requiring a
9 dental prosthesis, and cooled to substantially rigid condition to
10 form a custom dental impression tray.
11

12 In U.S. Pat. No. 4,024,636 Colpitts et al. disclose dentures
13 consisting of teeth anchored in a gum member composed of a mass of
14 a polyurethane foam elastomer, such as that commonly used in
15 insulation materials.
16

17 Monroy (U.S. Pat. No. 4,881,543) discloses a rapid denture
18 technique, based upon the use of a full arch of artificial teeth,
19 wherein the dentures are fabricated from a light-curable dental
20 material.
21

22 Although several references disclose heating dentures to
23 varying temperatures above a human's body temperature, none of
24 these references, either alone or in combination, teach the use of
25 a denture including a layer of reline material or silicone, which
26 when heated, can then be fitted within the mouth of an individual
27 in need of a denture without requiring the assistance of another
28 individual or a person skilled in the dental arts. Upper denture
29 embodiments of the present invention lack a palate, thereby
30 reducing the amount of material needed to manufacture the denture,
31 and which adds to the comfort of the denture when worn by an
32 individual.
33

34 In a prior patent (U.S. Pat. No. 3,838,513), this inventor has
35 described a method for forming a denture in situ in the mouth of an

1 individual. This method required the user to perform numerous
2 steps to make an impression; such steps included the application
3 of an adhesive to the tray, mixing and application of alginate
4 impression material, and positioning a spacer atop the impression
5 material, prior to inserting the tray into the mouth to form the
6 impression. The present invention eliminates these steps; the use
7 of a layer of reline material in the tray enables the denture to be
8 readily fitted by the individual with a minimum number of steps.
9

10 Thus, there is a long-felt need for inexpensive dentures which
11 can be readily fitted by edentulous persons, without entailing
12 numerous visits to a dental professional, and which can be provided
13 at a relatively low cost compared to the use of custom prepared
14 dentures. Embodiments of the present invention meet this need,
15 which also includes a method for using these denture embodiments.

1 BRIEF SUMMARY OF THE INVENTION

2
3 An objective of embodiments of the present invention is to
4 enable a person to fabricate their own denture directly in the
5 mouth without the assistance of a professional. The materials used
6 in the device are readily available to dentists and denturists and
7 are commonly used in dental procedures, although not necessarily
8 used in the manner described herein.
9

10 Starting with a replica of an edentulous arch in a molded
11 form, artificial dentures are formed. Embodiments of the present
12 invention include either a lower denture, an upper denture without
13 a palate or a set of dentures containing a layer of a dental reline
14 material. Part of the denture includes a tray which forms an
15 impression against the gums of the individual by means of a reline
16 acrylic material or a silicone pad within the tray. The silicone
17 acrylic pad is placed in warm water for a few minutes and is placed
18 into the mouth and will form directly, molding to the gums. The
19 bite will adjust itself to the opposing bite allowing the denture
20 to balance between the fit and the occlusion, providing a ready
21 made denture that can be fitted by the individual user without the
22 necessity of having impressions made and numerous fittings by a
23 dental professional.
24

1 DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

2
3 FIG. 1 is a perspective view of a denture embodiment of the present
4 invention.

5
6 FIG. 2 is a cross-sectional view taken along line 2--2 of FIG. 1.

7
8 FIG. 3 shows how the dentures are fitted within the user's mouth by
9 the teeth articulating together.

1 DETAILED DESCRIPTION OF THE INVENTION

2
3 An embodiment of the present invention is shown in FIG. 1 as
4 a set of dentures 10, which may comprise an upper denture 20 and a
5 lower denture 60. Embodiments of the present invention can be
6 either a complete set of dentures 10, or as individual upper
7 denture 20 or lower denture 60. As shown in the Figures, the upper
8 denture embodiment 20 is made without a palate, so that the lower
9 denture embodiment 60 and upper denture embodiment 20 are generally
10 similar to each other.

11
12 FIG. 1 illustrates the upper denture embodiment of the present
13 invention, but the description of the upper denture 20 is also
14 applicable to the lower denture embodiment 60, and reference
15 numerals for the upper denture 20 are applicable to lower denture
16 60. Each denture comprises what will be referred to herein as a
17 tray 22 which is generally U-shaped. Tray 22 includes a pair of
18 outer walls 24, inner walls 26 and a channel 28 between walls 26.
19 The outer walls 22 meet the inner walls 26 forming a flange 30. A
20 plurality of artificial teeth 32 are mounted in the tray 22, and
21 extend from the tray as shown. The teeth 32 are mounted within the
22 tray using techniques known to those skilled in the art. A layer
23 of heat-deformable material 34 (FIGs. 1, 2) is applied to the tray
24 22 and fills the channel 28. After the heat deformable material 34
25 has solidified, it conforms to the shape of the channel and walls,
26 forming a gum-receiving member 34.

27
28 As used within the context of the present specification,
29 deformable means formable or shapeable only at temperatures above
30 room temperature (approximately 66 -71 degrees F); i.e.,
31 deformable means heat formable. The term "formable", as used
32 within the present specification, means formable or shapeable at
33 either about room temperature or at elevated temperature.

1 Each tray (whether for an upper or a lower denture) is
2 prepared from a master replica of an edentulous arch using standard
3 dental molding methods and materials. In this manner, each tray
4 has the contour of a typical arch found in the mouth of an adult.
5 The tray 22 can be prepared by vacuum-forming from a sheet of
6 material, or by other techniques such as injection-molding or blow-
7 molding.

8
9 The materials for the tray include methyl methacrylate, ethyl
10 methacrylate, and other longer chain alkyl methacrylates. A
11 representative acrylic resin can be made from a mixture of methyl
12 methacrylate liquid monomer, a methyl methacrylate polymer powder,
13 and a plasticizer such as diethyl phthalate, dioctyl phthalate, and
14 mixtures thereof, or other suitable plasticizers known to those
15 skilled in the art. Other agents that can be used include
16 polyethyl methacrylate, polypropyl methacrylate or polybutyl
17 methacrylate.

18
19 The tray may be a molded form which includes a plurality of
20 individual cavities to receive a set of artificial teeth. Either
21 a plurality of individual teeth 32 may be placed in the cavities,
22 or the teeth 32 may be formed by pouring a mixture of shaded
23 acrylic material into the cavities, which will then form the
24 individual teeth and become attached to the tray after curing.
25 Curing is effected using the curing process appropriate to the
26 particular materials, as known to those skilled in the art.

27
28 The teeth inserted into the tray are designed to be almost a
29 complete set, representing the incisors, cuspids, bicuspid and the
30 first molar; second and third molars may or may not be included,
31 because many adults often do not have their second and/or third
32 molars. The teeth can be colored in different shades.

33
34 After the tray has been formed and the teeth added, the relined

1 material 34 is applied to the cured denture, and the reline
2 material 34 allowed to cure as appropriate for the particular
3 material; the reline material conforms to the shape of the channel.
4

5 The reline material is selected from any of the soft, heat
6 deformable reline materials commercially available as known to
7 those skilled in the art. This can be either an acrylic reline
8 material, a silicone reline material, or a silicone pad.
9 Embodiments of the present invention employ a cushion material
10 liner. One example of a silicone reline material is sold under the
11 trademark MOLLOSIL® (Buffalo Dental Manufacturing Co., Inc,
12 Syosset NY); both acrylic and silicone reline materials sold by
13 Dentsply International, York PA, or distributors such as Darby-
14 Spencer-Mead Dental Supply Co (Westbury NY).
15

16 The thickness of the reline material is generally in the range
17 of about 1 mm to about 5 mm, but a thickness of about 1.5-3 mm is
18 generally used. The optimum materials for making and fitting the
19 dentures 20 and 60 are best selected by a modest amount of
20 experimentation and observation by those of ordinary skill in the
21 art.
22

23 In use, the individual selects the appropriate size and type
24 of denture desired, i.e., whether upper, lower or both. It is
25 generally accepted that there is not a great deal of variation in
26 the sizes of the mouth of adult human beings; it is possible to
27 manufacture the denture with just a few basic sizes, knowing that
28 they can be custom fitted to an individual provided that the proper
29 size is selected at the outset. Thus, a distributor of embodiments
30 of the present invention would only be required to carry a few
31 sizes from which the user would make their selection.
32

33 Where necessary, the selected denture may be shortened by
34 cutting or filing, or the length of the teeth may be shortened by

1 grinding or filing. The denture is then placed in warm water
2 (using a quantity of warm water for a period of time sufficient for
3 the layer of reline material to become soft). Generally, the
4 temperature of the water is greater than ambient temperature
5 (generally 18 degrees C - 21 degrees C, or between 66 - 71 degrees
6 F) but less than 100 degrees C (212 degrees F). The temperature of
7 the water can be from approximately 38 degrees C (approximately 100
8 degrees F) to approximately 95 degrees C (approximately 204 degrees
9 F); or the temperature of the water can be from approximately 45
10 degrees C (approximately 112 degrees F) to approximately 80 degrees
11 C (approximately 176 degrees F); or the temperature of the water
12 can be from approximately 51 degrees C to approximately 58 degrees
13 C (approximately 125 degrees F to approximately 135 degrees F).
14 Depending upon the temperature of the water, this is generally
15 between 2 to 10 minutes. Once the layer of reline material 34 has
16 become softened, the denture is removed from the warm water, and is
17 inserted into the person's mouth. The manner of use will vary
18 depending whether the person is using only a single, i.e., a lower
19 or an upper, denture, or a set of dentures (both lower and upper).
20 In an embodiment of the present invention, the user should maintain
21 the denture at a temperature of between approximately 125 degrees
22 F to approximately 135 degrees F, and generally for between
23 approximately 6 to approximately 8 minutes for the material to
24 become sufficiently soft and adaptable to the user's gums.

25
26 For an upper denture, the denture is positioned onto the
27 user's arch, where it can be held in position using finger
28 pressure, such as being held in place by the person's thumbs. If
29 the person has lower teeth, after positioning the upper denture,
30 the person bites down and holds the bite for a few minutes (such as
31 2-3 minutes; FIG. 3). By biting for several minutes, the bite of
32 the denture adjusts itself to the opposing bite allowing the
33 denture to balance between the fit and the occlusion.

1 If the person is using both upper and lower dentures, after
2 positioning each denture on the appropriate arch, the person bites
3 down and holds the bite for a few minutes (such as 2-3 minutes).
4 During this time period, the force exerted onto the reline material
5 by the individual enables the softened reline material 34 to
6 conform to the contours of the person's gums, and as the reline
7 material 34 cools it retains these contours, forming a denture that
8 fits the person's mouth. There is no need to mix reagents to form
9 impressions, no need to remove excess impression material, or have
10 excess impression ooze into one's mouth, which often causes the
11 person to gag, and no need to remove impression material from the
12 denture once it has been fitted.

13
14 Embodiments of the present invention can include a kit form,
15 the dentures supplied as either a complete set (both upper and
16 lower dentures), or as a lower or an upper denture, with
17 instructions for use. For convenience, the denture may be produced
18 in one of three sizes, a small, medium and a large size.

19
20 Embodiments of the present invention can be used in a method
21 for forming a denture in situ in the mouth of an edentulous person.
22 By following simple illustrated instructions, individuals can
23 readily fabricate their own dentures without the assistance of a
24 professional, although if the person so chooses, the assistance of
25 a dental professional may be used. This inventor believes
26 embodiments of the present invention represent the first time an
27 edentulous patient can use the unique application and prepared
28 prosthesis.

29
30 An advantage provided by the present invention in the in situ
31 formation of dentures include the need to have available only a
32 limited number of tray sizes to have a tray of an appropriate size
33 for most persons. Other advantages include the ability of the
34 denture to conform uniformly to the arch of the person; the ability

1 to form a denture in which the outer surfaces of the gums simulate
2 the contours of the actual outer gum surfaces of the person; and
3 because the reline material is soft, embodiments of the present
4 invention include the ability to accommodate high spots on the arch
5 or undercuts in dental surfaces without causing discomfort to the
6 person, as is common when a rigid denture material is used.

7
8 Another advantage of the direct molding process employed to
9 make the denture used in the present invention is the elimination
10 of the palate of the upper denture. This effects a cost savings,
11 because a lot less material is used in the denture, but more
12 importantly, it makes using the upper denture embodiment of the
13 present invention less stressful than that associated with
14 conventional dentures which include the palate. In conventional
15 upper dentures that include a palate, the palate is a major source
16 of discomfort for the wearer, because of difficulties in conforming
17 it to the shape of the individual, and the presence of a hard
18 palate within the mouth.

19
20 The present invention's method of forming the denture in situ
21 in the mouth of an individual eliminates the need for making an
22 impression, the try-in of dentures, and the use of dental materials
23 that may be uncomfortable. The method and materials employed in
24 the present invention may also be more favorable to the dental
25 tissue of the user. Delivery of the denture to the user is
26 immediate, whereas the conventional method of denture manufacture
27 and fitting may take weeks of processing.

28
29 Therefore, although this invention has been described with a
30 certain degree of particularity, it is to be understood that the
31 present disclosure has been made only by way of illustration and
32 that numerous changes in the details of construction and
33 arrangement of parts may be resorted to without departing from the
34 spirit and scope of the invention.